Journal of Development Economics 37 (1992) 155-172. North-Holland

The black market for dollars in Chile

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Received August 1989, final version received March 1991

This study investigates the effects of foreign exchange restrictions on the black market premium for dollars in Chile over the period 1975-1984. The model emphasises the interaction of stock and flow conditions in the black market for dollars. Our results support the view that the real exchange rate, the official depreciation-adjusted interest rate differential, the dollar value of peso assets valued at the official exchange rate, and foreign exchange restrictions are important determinants of the black market premium.

1. Introduction

The black market for dollars in Chile emerged in 1962 when foreign exchange restrictions were introduced. The purpose of the paper is to investigate the effects of foreign exchange restrictions on the determination of the black market premium (black market less official rate) over the period 1975–1984. At the beginning of the period, exchange and trade restrictions were relaxed as part of a liberalisation program which was subsequently reversed in 1982, following the deterioration of the economic situation in Chile and the shortage of foreign exchange reserves.

The study is based on a model developed by Dornbusch, Dantas, Pechman, Rocha and Simoes (1983) – hereafter referred to as the DDPRS model – for the black market for dollars in Brazil.[1] The main feature of the model is the interaction of stock and flow conditions in the black market in determining both the premium on foreign exchange and the rate of change of the stock of black dollars. According to their model, the main determinants of the black market premium are the official real exchange rate, the official depreciation-adjusted interest rate differential and seasonal factors associated with tourism.

*I would like to thank the participants of the finance workshop at City University Business School, especially Roy Batchelor and David Blake, the editor and an anonymous referee for their most helpful comments on a previous version of this paper. I am also grateful to Jan Duesing and Carmen Li for their efficient research assistance.

[1]The determinants of black market exchange rates have also been analysed empirically by Culbertson (1975), Blejer (1978), Gupta (1980) and Olgun (1984).

0304-3878/91/$03.50

The model relies on the assumption that the black market exchange rate has no effect on the determination of the interest rate nor on the course of the official exchange rate. This assumption is warranted for Brazil where the daily black market turnover is negligible compared to total financial market trade. This also applies to some other Latin American countries including Chile.

In the current study, we extend the DDPRS stock–flow model to allow for foreign exchange restrictions on international trade and capital transactions explicitly. A stock–flow model is appropriate for our purposes since foreign exchange restrictions may affect both the stock market and flow market for black dollars. We also fit an error-correction mechanism (ECM) to the data which enables us to capture both the short-run and long-run behaviour of the black market premium.[2]

The paper is divided into five sections. Section 2 presents the model while section 3 discusses the effects of the foreign exchange restrictions on the black market premium. The empirical results and the conclusion are given in sections 4 and 5, respectively.

2. The model

The black market exchange rate is modelled in a partial equilibrium framework, taking as given the prevailing interest rate in Chile and abroad, the official exchange rate, the peso value of non-dollar assets and the foreign exchange restrictions on international transactions. The stock of black dollars is held as part of a diversified portfolio, while the flow market for black dollars arises out of international transactions in goods and services. In such a framework, the role of portfolio decisions, in conjunction with the assumption of perfect foresight, implies that changes in the stock market or in the flow market induce an immediate jump in the premium and a subsequent adjustment path for both the premium and the stock of dollars.[3]

2.1. The stock market for black dollars

The stock demand for black dollars is assumed to be proportional to wealth $[(A/r)+B]$, where A is the value of peso assets, B the existing stock of black dollars and r the peso price of dollars in the black market. Demand is also a positive function of the interest rate differential adjusted for the rate of depreciation of the peso in the black market and the effective tax resulting from the imposition of controls on international capital flows.

[2]A thorough presentation of ECM models can be found in Davidson et al. (1978) and Hendry et al. (1984).

[3]The model draws from the literature on exchange rate determination developed by Kouri (1976), Dornbusch (1975, 1976), Rodriquez (1980) and Dornbusch and Fisher (1980).

The tax implications of capital controls have been explored extensively by Aliber (1973), Phylaktis and Wood (1984) and Phylaktis (1988, 1990). The sign of the tax depends on its effect on the relative rates of return on domestic assets held by foreigners and on foreign assets held by domestic residents. For example, restrictions on the repatriation of profits constitute a positive tax on the rate of return on domestic assets held by foreigners;[4] and preferential exchange rate on foreign loans a negative tax or subsidy on foreign borrowing by domestic residents.[5]

[4]In fig. F.1 below, we show the domestic capital market for a capital importing country. *SS* shows the desired level of investment held in the country by foreigners at different interest rates. *DD* shows the net demand for capital at any rate after domestic purchase of assets. The imposition of restrictions on the repatriation profits causes *SS* schedule to shift up by the implicit tax rate (t) on the rate of return on domestic assets held by foreigners. The interest rate faced by foreigners is i'' and that faced by residents is i'. The foreign held stock of capital is reduced from *OA* to *OB*.

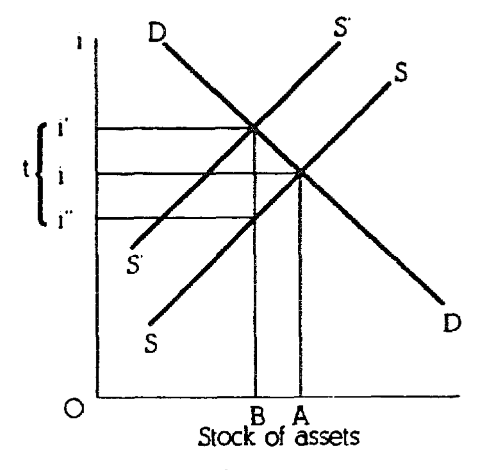


Fig. F.1

[5]In fig. F.2 the *SS* schedule shifts down by the amount of implicit subsidy (s) on the cost of foreign borrowing. The foreign owned stock of capital is increased from *OA* to *OB* and the domestic interest rate falls to i'.

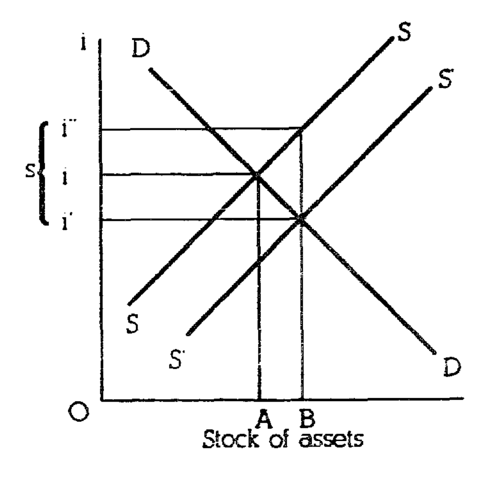


Fig. F.2

Equilibrium in the stock market for black dollars requires that demand equals the existing supply:

$$B = h(i^{f} + b - (i + t))\,[(A/r_{f} + B], \quad h' > 0, \tag{1}$$

where i^{f} and i are the nominal interest rate on dollars and pesos respectively, b is the rate of depreciation of the peso in the black market, and t is the effective tax.

Eq. (1) can be rewritten as

$$(xB)/(xB + \bar{A}) = h(i^{f} + b - (i + t)), \tag{2}$$

where x is the black market premium (actually one plus the premium), defined as the black market exchange rate divided by the official exchange rate e, and $\bar{A}$ the dollar value of peso assets valued at the official exchange rate, i.e. $\bar{A} = A/e$.

The rate of depreciation of the official exchange rate is taken as given and is denoted by d. The rate of change of the black market premium $\dot{x}/x$ is then equal to the difference between the rates of depreciation of black dollars and of the official rate:

$$\dot{x}/x = b - d. \tag{3}$$

Substituting from (3) into (2) and inverting the resulting equation we get

$$\dot{x}/x = G(xB/\bar{A}) - (i^{f} + d - (i + t)), \quad G' > 0. \tag{4}$$

Eq. (4) gives a dynamic relation between B, x and $\dot{x}$ for given values of $\bar{A}$, i^{f}, d, i and t. From an initial stock equilibrium, a rise in the official depreciation-adjusted interest differential will create an excess demand that needs to be offset by a rise in the relative supply of black dollars $(xB/\bar{A})$ through a higher level of the premium or through an offsetting decline in demand due to a falling premium. In fig. 1 the $\dot{x} = 0$ locus sketches the stock equilibrium equation when the rate of change of the black market premium is zero and the depreciation adjusted interest rate differential and dollar value of peso assets are given. The $\dot{x} = 0$ locus is a rectangular hyperbola. Points to the right of the $\dot{x} = 0$ schedule imply a rising $\dot{x}/x$ to clear the excess supply of black dollars; the converse applies at points to the left.

2.2. *The flow market for black dollars*

The flow demand is composed of demand by smugglers of imported, especially manufactured, goods and of demand by Chileans travelling abroad,

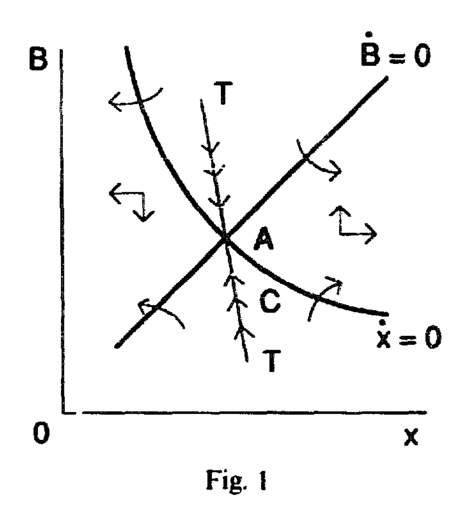


Fig. 1

limited to a specific dollar allowance. Furthermore, the demand for black dollars is a positive function of wealth. The supply of black dollars is provided by export smugglers and tourists to Chile.[6]

The current account of the black market or the net rate of addition to the stock of black dollars is assumed to be a function of the premium x, the real value c of the official exchange rate, import tariffs w, travel allowance q and wealth $[(A/r)+B]$:

$$\dot{B}=F(x,c,w,q,(A/r)+B), \qquad F_x>0, \quad F_c>0, \quad F_w<0 \text{ and } F_q>0. \quad (5)$$

Defining as before $\bar{A}=A/e$, (5) can be expressed as

$$\dot{B}=F(x,c,w,q,(\bar{A}/x)+B). \quad (6)$$

Eq. (6) gives a dynamic relation between $\dot{B}$, B and x for given values of c, w, q, and $\bar{A}$. From an initial flow market equilibrium, a rise in the black market premium reduces import smuggling and Chilean tourism abroad. There is a further reduction in the demand for black dollars because of the fall in wealth due to the fall in the value of peso assets. At the same time there is an increase in the supply of dollars by export smugglers. The two effects give rise to an excess supply of black market dollars – current account surplus – and a net rate of addition to the stock of black market dollars. Restoration of equilibrium is achieved through the increase in B which increases wealth and the demand for flow market black dollars.

A balanced current account in the black market is represented by the $\dot{B}=0$ locus in fig. 1 which is drawn for a given real exchange rate, commercial

[6]There is also the phenomenon of 'quasi-smuggling' [see Bhagwati and Hansen (1973)] when under-invoicing of exports and over-invoicing of imports takes place. The nature of the black market for foreign currency is also described in Gupta (1980).

policy, foreign exchange allowance and peso assets valued at the official exchange rate. Points to the right of this locus imply a premium higher than what is suggested by flow market equilibrium, a surplus in the current account of dollars and positive addition to the stock of black dollars. The resulting increase in wealth increases the flow demand and restores current account balance. The converse is true for points to the left. It should be noted that in the DDPRS model the $\dot{B}=0$ locus is vertical. This is due to their assumption that the demand for flow dollars does not depend on wealth so changes in B do not feed into the flow market. Their assumption implies that there is only one black market premium which maintains flow market equilibrium.

The flow market for black dollars depends also on exogenous variables such as the real value of the official exchange rate, import tariffs and the travel allowance. A gain in competitiveness reduces the relative cost of Chilean commodities and services and therefore the demand for black dollars by import smugglers and Chilean tourists, giving rise to increased net inflows of black dollars. Looking now at foreign exchange restrictions, a fall in nominal import tariffs or an increase in foreign currency allowance for travelling will reduce the flow demand for black dollars; the net rate of addition to the stock of black dollars increases.

2.3. *Stock and flow market equilibrium for black dollars*

The long-run stock–flow equilibrium is attained at A, the intersection of the $\dot{x}=0$ and $\dot{B}=0$ locus. The arrows in fig. 1 indicate that there is a unique trajectory TT along which the market will converge to the steady state at point A. We assume perfect foresight and that the market picks the stable arm TT. Thus, starting from an initial stock of black dollars below the steady state, e.g. at point C, implies a relatively high and falling premium that gives rise to a current account surplus and hence a rising stock. As the stock rises over time, holders are compensated by reduced rates of depreciation of the black market rate relative to the official rate.

3. The effects of foreign exchange restrictions in the black market for dollars

In this section, we look at the impact and long-run effects in the black market for dollars of changes in the following foreign exchange restrictions: the restrictions on the repatriation of profits and the servicing of foreign debt; the restrictions on goods imported and on the amount of foreign currency that Chilean tourists are allowed to take when travelling abroad.

Consider first the introduction of restrictions on the repatriation of profits. In terms of portfolio decisions this restriction constitutes an implicit tax on

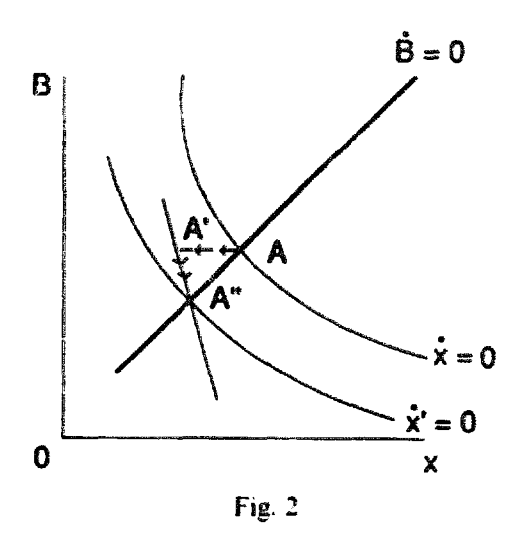


Fig. 2

the rate of return on domestic assets held by foreigners. It results in a reduction of foreign holdings of domestic assets and a rise in the domestic interest rate (t is positive). Peso denominated assets become more attractive, and this leads to a fall in the demand for black dollars. To restore stock equilibrium with an unchanging premium, the relative supply of black market dollars has to fall. In fig. 2 this is shown by a shift of the stock equilibrium schedule to $\dot{x}'=0$. Thus, starting from an initial position at A, the impact effect of a portfolio adjustment following the introduction of restrictions on the repatriation of profits is an initial fall in the premium, represented by point A', to clear the stock market given the stock of black dollars. Over time, the lower premium gives rise to an excess demand for black dollars in the flow market, i.e. a current account deficit, which reduces the stock of black dollars and increases the black market premium until the market equilibrium is restored at point A''. At this point, the premium is less than the initial level. This is due to the wealth effect in the flow market for dollars. As the stock of black dollars falls there is a fall in the flow demand for dollars which helps restore current account balance before the premium returns to the initial level. This contracts with the implications of the DDPRS model where $\dot{B}=0$ is vertical, implying no long-run effect on the black market premium of shocks to the stock market.

It is also possible for this restriction to have effects in the flow market for black dollars. When this control was in effect, only 14 percent of the amount of capital invested could be repatriated as profits. Foreign investors may have evaded the restriction and repatriated profits by purchasing dollars in the black market. The increase in the demand for black dollars causes a shift of the $\dot{B}=0$ schedule to the right to $\dot{B}'=0$ as a higher premium is required to offset the increased drain (see fig. 3). The impact effect is for the premium to rise as the market jumps from A to A'. At point A', however, there is a current account deficit in the black market that leads to a gradual decline in

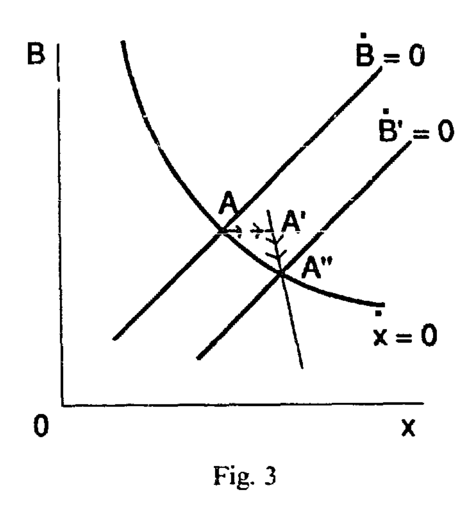


Fig. 3

stocks until equilibrium is reached at A''. Thus, restricting the amount of profits which can be repatriated might give rise, in both the short run and the long run, to either a rise or a fall in the premium, depending on the relative strength of the effects in the stock and flow markets for dollars.

Let us now consider the introduction of a preferential exchange rate for servicing foreign debt. In portfolio analysis terms, this kind of restriction constitutes an implicit subsidy on the cost of foreign borrowing. This encourages domestic residents to borrow abroad, causing the domestic interest rate to fall (t is negative). Dollar denominated assets become more attractive, the black market premium increases on impact and then decreases (along with an increase in the stock of black dollars). The effects are just the opposite of the previous case, since the $\dot{x}=0$ locus shifts upwards.

A preferential exchange rate might also affect the flow market for black dollars because it releases the pressure on the demand for black dollars (at least in part), giving rise to a fall in the premium (the $\dot{B}=0$ schedule shifts to the left). Thus, introducing a preferential exchange rate for foreign loans might also give rise, both in the short run and in the long run, to either a rise or a fall in the premium depending on the relative strength of the effects in the stock and flow markets for black dollars.

Other foreign exchange restrictions used extensively in Chile are those on trade and tourism. Chile implemented a gradual reduction of nominal import tariffs, from 57 percent at the beginning of the period to 10 percent, as part of its trade liberalisation program. This policy, however, was reversed in 1983. A similar pattern can be observed in respect of the travel allowance for Chileans travelling abroad. The allowance was increased substantially up to the second quarter of 1982. Thereafter, it was reduced and by 1983 reached the same level as in 1975.

Import tariffs and rationing of foreign currency for the purpose of

travelling abroad increase the flow demand for black dollars. For a given stock of dollars, the black market premium rises, leading to a rightward shift of the $\dot{B}=0$ schedule. The impact effect is therefore a jump in the premium as the market adjusts to the new information. Over time, as the stock of dollars decreases because of the current account deficit in the black market, the premium increases further and equilibrium is achieved at A'' with a higher premium and lower stock of dollars (fig. 3).

4. Empirical results

By combining the flow market equilibrium represented by (6) with the stock market equilibrium represented by (4), we can derive a reduced form equation for the black market premium which depends on the adjusted interest rate differential (i^f+d-i), the real value of the official exchange rate c, import tariffs w, travel allowance q, the dollar value of peso assets $\bar{A}$; and the various types of capital controls – the preferential exchange rate on foreign loans g, the minimum maturity on foreign loans m and the restrictions on the repatriation of profits p.[7] By fitting an ECM model to the data to capture both the short-run and long-run behaviour of the black market premium, the equation that we estimated was

$$\begin{aligned}\Delta x_t &= \beta_0+\beta_1\Delta x_{t-1}+\beta_2\Delta(i^f+d-i)_t+\beta_3\Delta c_t+\beta_4\Delta\bar{A}_t\\ &+\beta_5\Delta p_t+\beta_6\Delta m_t+\beta_7\Delta g_t+\beta_8\Delta w_t+\beta_9\Delta q_t+\beta_{10}x_{t-1}\\ &+\beta_{11}(i^f+d-i)_{t-1}+\beta_{12}c_{t-1}+\beta_{13}\bar{A}_{t-1}+\beta_{14}p_{t-1}\\ &+\beta_{15}m_{t-1}+\beta_{16}g_{t-1}+\beta_{17}w_{t-1}+\beta_{18}q_{t-1}+u_t. \end{aligned} \quad (7)$$

In the long run, we set

$$\Delta x_t=\Delta x_{t-1}=\Delta(i^f+d-i)_t=\Delta c_t=\Delta\bar{A}_t=\Delta p_t=\Delta m_t=\Delta g_t=\Delta w_t=\Delta q_t=0$$

so that eq. (7) implies that the long-run black market premium depends on

$$x^*=a_2(i^f+d-i)^*+a_3c^*+a_4\bar{A}^*+a_5p^*+a_6m^*+a_7g^*+a_8w^*+a_9q^*+u_t, \quad (8)$$

where

$$a_2=-\beta_{11}/\beta_{10},\quad a_3=-\beta_{12}/\beta_{10},\quad a_4=-\beta_{13}/\beta_{10},\quad a_5=-\beta_{14}/\beta_{10},$$

[7] Legal requirements on the maturity of foreign loans were imposed to control the inflow of foreign capital. These requirements increase the cost of foreign borrowing and their stock and flow effects on the black market premium are similar to those of controls on the repatriation of profits.

$$a_6 = -\beta_{15}/\beta_{10}, \quad a_7 = -\beta_{16}/\beta_{10}, \quad a_8 = -\beta_{17}/\beta_{10}, \quad a_9 = -\beta_{18}/\beta_{10}.$$

The value of the coefficients in eq. (8) will enable us to test whether our Chilean data support our model in preference to the DDPRS model. As explained in the previous section, apart from the explicit introduction of foreign exchange restrictions, our model differs from the DDPRS model with regard to the slope of the $\dot{B}=0$ locus. In our model the $\dot{B}=0$ locus is upward sloping while in the DDPRS model it is vertical. One implication of the vertical $\dot{B}=0$ locus is upward sloping while in the DDPRS model it is vertical. One implication of the vertical $\dot{B}=0$ locus is that there is no long-run effect on the black market premium of shocks to the stock market. In terms of eq. (8) the DDPRS model implies $a_2=0$ in the long run while our model implies an a_2 significantly different from zero (and positive). Furthermore, we have seen that the various capital controls have stock and flow market effects. In the DDPRS model the stock market effect should be zero in the long run. Thus, the data would also support our model in preference to DDPRS when the stock market effect of capital controls dominates the flow market effect. In terms of our model this requires $a_5<0$, $a_6<0$ or $a_7>0$.

The data used to estimate eq. (7) are defined in Appendix A. The various types of foreign exchange restrictions used in Chile, apart from tariffs, were represented by dummy variables, with the tightness of each measured on a multistep scale. The range of values of each dummy variable is depicted in Appendix B (tables B.1 and B.2). There is no natural way of representing these restrictions, so where possible, both linear and non-linear procedures for generating the values of the dummy variables were used. It should be noted that the tighter the restriction the larger the value of the relevant dummy. This implies that in the case of the travel allowance, the value of the dummy becomes smaller as the allowance becomes bigger.

It turned out that another dummy variable was needed. A dummy variable was introduced for 1983:1 to account for the financial crisis which shook the banking system. Following a severe recession in 1982 – real output fell by 14 percent – the banks found themselves with a substantial volume of non-performing assets. The banking system was saved from collapse when the government took over eight banks including the country's two largest. This meant that 60 percent of all Chile's bank assets were in government hands.[8] It was only in 1985 that the government started to establish a framework for reprivatizing the Chilean banks. It is possible that the uncertainty that this event created had an impact on the unregulated market for black market dollars.

Table 1 presents the regression results for Chile for the period 1975:2–1984:4 (using quarterly data). The parameters were estimated by the

[8] For more details, see Corbo (1985) and Velasco (1988).

Table 1

Regression results.[a]

Variable	Coefficient	T-ratio
Constant	20.03	1.81
Δx_{t-1}	0.19	5.07
$\Delta(i^f+d-i)_t$	11.82	1.81
Δc_t	−1.25	−4.02
$\Delta \bar{A}_t$	5.50	3.50
Δq_t	12.43	1.50
Δm_t	−6.75	−2.24
Δg_t	17.33	2.61
ΔU_t	67.57	15.20
x_{t-1}	−0.99	−18.35
$(i^f+d-i)_{t-1}$	31.84	1.99
c_{t-1}	−1.02	−5.54
$\bar{A}_{t-1}$	2.07	1.87
q_{t-1}	23.04	2.31
g_{t-1}	36.73	7.26
w_{t-1}	0.37	5.05
U_{t-1}	−10.79	−2.77

$\bar{R}^2=0.98$

Number of observations = 38

Standard error of regression = 2.89

Diagnostic tests:

F-test for serial correlation:	2.47 $F(4,17,95\%)$	= 2.96
Reset test for functional form:	0.98 $F(1,20,95\%)$	= 4.35
Test for heteroscedasticity:	0.76 $F(1,36,95\%)$	= 4.08
Test of normality of residuals:	5.97 Chi-sq (2,95%)	= 5.99
Chow test for predictive failure:	1.78 Chi-sq (1,95%)	= 3.80

[a]The variables are defined as follows: x is the black market premium; (i^f+d-i) is the interest rate differential; c is the real exchange rate; $\bar{A}$ is the dollar value of peso assets; q is the travel allowance; m is the minimum maturity on foreign loans; g is the preferential exchange rate on foreign loans; w is the import tariff; and U is a dummy for 1983:1 to 1984.4 to account for the uncertainty created by the financial crisis and government intervention in the banking system.

The dependent variable is Δx. x, (i^f+d-i), c and w are expressed as percentages and $\bar{A}$ in billions of U.S. dollars.

ordinary least squares technique. We found that neither the coefficients nor their t-values were sensitive to the functional form for the dummy variables. The results of various diagnostic tests to detect functional mis-specification are also given in the table. Firstly, the F-test for serial correlation suggests that the estimated residuals do not exhibit significant serial correlation. Secondly, the Ramsey and Schmidt test which uses the square and cube of

the fitted values indicates no functional mis-specification. Thirdly, the F-test for homoscedasticity suggests that the hypothesis cannot be rejected. Finally, the Lagrange Multiplier test indicates that it is not possible to reject the hypothesis of normality of the error process. Overall the model appears to be well specified.

The results in table 1 imply also that the long-run equation for the black market premium is given by

$$\begin{aligned} x^* = 20.52 &+ \underset{(1.98)}{32.25}(i^f + d - i)^* - \underset{(-5.93)}{1.04}c^* + \underset{(1.89)}{2.09}\bar{A}^* \\ &+ \underset{(2.34)}{23.33}q^* + \underset{(6.93)}{37.20}g^* + \underset{(5.39)}{0.38}w^* - \underset{(-2.58)}{10.93}U^*. \end{aligned}$$

The empirical results show that the interest rate differential, the real exchange rate and the dollar value of peso assets have the expected sign and are statistically significant in both the short run, i.e. in differences, and the long run. An increase in U.S. interest rate relative to that in Chile adjusted for official depreciation, leads to an increase in the premium. A real depreciation leads to a decline in the premium. The long-run effects of both of these variables are bigger than those found in DDPRS when they estimated a static equation for the black market premium using Brazilian data. A 1 percent increase in $(i^f + d - i)$ leads to 32 percent increase in the premium in the case of Chile, compared to 12 percent in the case of Brazil. Also 1 percent real depreciation leads to 1 percent fall in the premium in the case of Chile compared to only 0.09 of one percent in the case of Brazil. Finally, an increase in the dollar value of peso assets increases both stock and flow demand for black dollars causing the premium to rise.[9]

We tested for five foreign exchange restrictions. Four of these were found to have a statistically significant effect on the black market premium. Two of them, namely the foreign currency allowance and the import tariff, affect only the flow market for black dollars. We found that a 10 percent increase in the import tariff, which increases the demand for black dollars by import smugglers, will cause the premium to rise in the long run by 3.8 percent. This restriction does not have an effect on the premium in the short run.

In contrast, a change in the travel allowance affects the premium both in the short run and in the long run. A reduction in the travel allowance, i.e. an increase in the value of the dummy, increases the demand for black dollars by Chilean tourists and causes the premium to rise more so in the long run than in the short run.

[9]It should be noted that this variable was excluded without justification from the reduced form equation estimated by DDPRS.

The remaining two restrictions which were found to be statistically significant concern foreign loans. These are the preferential exchange rate on such loans and the restriction on the maturity of the loans. As explained in section 3 both these restrictions affect the stock and flow market for black dollars. In the case of the preferential exchange rate the stock market effect is positive and the flow market effect is negative. The opposite applies to the minimum maturity on foreign loans. The estimated sign of the coefficients for both restrictions indicates that the stock market effect more than offsets the flow market effect. Furthermore, the restriction on the minimum maturity on foreign loans affects the black market premium considerably less than the preferential exchange rate and only in the short run.

The only restriction that was found not to have an effect on the black market premium, either in the short run or in the long run, related to the repatriation of profits. A possible explanation for this could be the fact that this restriction affected the subsidiaries of multinational companies (MNCs) in Chile which were able to evade it with the cooperation of the parent companies overseas (and so not have resorted to the black market), by using a popular device widespread in some Latin American countries, called 'dividend or profit round-tripping'.[10] This involved the following series of transactions. A foreign bank lent to the MNC subsidiary in Chile with the participation of the head office. The cost of that loan to the MNC involved an $X\%$ spread over LIBOR. Subsequently the head office of the foreign bank borrowed from the parent company overseas dollars equivalent to the peso loan in Chile. The cost difference between the loan to the subsidiary in Chile, spread over LIBOR, and the rate charged overseas, which at least did not include spread, was consolidated as profits. In addition, the bank could have charged a service fee.

5. Conclusion

In this paper, the determinants of the black market premium for the U.S. dollars in Chile are examined with special emphasis on the effects of foreign exchange restrictions. A stock–flow model was developed based on Dornbusch et al. (1983) – DDPRS. An ECM-type equation was fitted to the data in order to capture both the short- and long-run behaviour of the black market premium.

The empirical evidence suggests that the real exchange rate, the interest rate differential, peso assets valued at the official exchange rate, and foreign exchange restrictions, such as those on the repatriation of profits, the servicing of foreign debt, goods imported, and on foreign currency for

[10]See various issues of Business International Corporation.

Chilean tourists, explain 98 percent of the variation in the black market premium.

The only restriction found not to have a statistically significant effect on the black market premium was that representing the repatriation of profits. Our explanation for this was that the MNCs affected by this restriction could have evaded it and not have resorted to the black market through the use of a device called 'profit round-tripping'.

Furthermore, our Chilean data favour our model in preference to the DDPRS model. Apart from the explicit introduction of foreign exchange restrictions, our model differs from the DDPRS model with regard to the slope of the $\dot{B}=0$ locus. In our model the $\dot{B}=0$ locus is upward sloping while in the DDPRS model it is vertical. One implication of the vertical $\dot{B}=0$ locus is that there is no long-run effect on the black market premium of shocks to the stock market. Our results show that factors affecting the stock market for black dollars such as the interest rate differential and the preferential exchange rate on foreign loans, influence the black market premium in the long run.[11]

The exercise in this study has important implications for the formulation of policy concerning foreign exchange restrictions. We have established that the black market for dollars provides a way for funding attempts to circumvent foreign exchange restrictions. At the same time, increases in the black market premium motivates exporters to divert export earnings to the black market or to underinvoice exports that would have normally passed through official channels and lower official foreign reserves. Thus, restrictions which encourage economic agents to resort to the black market, affect official foreign reserves through this route. This effect might dampen the direct effect of restrictions on official foreign reserves.

For example, import tariffs are intended to reduce imports and improve official foreign reserves. We have, however, found in this study that tariffs, by encouraging import smuggling, tend to increase the black market premium, which in turn motivates exporters to direct export earnings to the black market that would have otherwise passed through official channels and lower the level of official foreign reserves. Thus, the monetary authorities will have to impose a higher level of import tariffs to achieve a specific improvement in official foreign reserves in view of this indirect negative effect on the reserves. Similar comments can be made about the other foreign exchange restrictions that have been found to affect the black market premium.

In conclusion, the black market for foreign exchange, although in the shadow of the official foreign exchange market, should be of interest to the

[11]An F-test was also performed on the joint significance of the interest rate differential and the preferential exchange rate on foreign loans in explaining the black market premium. The $F(2,21)$ statistic was 26.65 compared with the critical value of 3.47 at 95 percent level of significance.

monetary authorities in the formulation of their policy on foreign exchange restrictions.

Appendix A

Table A.1

Data sources.

Variable	Description/source
i	30–90 day commercial bank deposit interest rate, Sintesis Monetaria y Financiera Informe Financiero, Banco Central de Chile.
i^f	90 day U.S. Treasury bill rate, Federal Reserve Board Bulletin.
x	$((r-e)/e)*100$. e represents the peso dollar rate, Boletin Mensual, Banco Central de Chile; and r represents the black market peso dollar rate, Pick's Currency Year book (now called World Currency Yearbook).
c	$(ep^f/p)*100$. p^f is the consumer price index for the U.S. and p is the price index of Chilean home and imported goods. Both series were taken from International Financial Statistics, International Monetary Fund (IMF).
g	Preferential exchange rate on foreign loans, Annual Report on Exchange Arrangements and Exchange Restrictions, IMF.
q	Foreign currency allowance for Chilean tourists, Annual Report on Exchange Arrangements and Exchange Restrictions, IMF.
w	Average nominal import tariff; Banco Central de Chile.
m	Minimum maturity on foreign loans, Annual Report on Exchange Arrangements and Exchange Restrictions, IMF.
p	Restrictions on the repatriation of profits, Annual Report on Exchange Arrangements and Exchange Restrictions, IMF.
$\bar{A}$	A/e. A represents peso assets which is the sum of demand and time deposits held by the banks, International Financial Statistics, IMF. e represents the peso dollar rate, Boletin Mensual, Banco Central de Chile.

Appendix B

Table B.1

Foreign exchange restrictions in Chile, 1975–1984.

		Restrictions on the repatriation of profits, dividends and royalties[a]	Restrictions on foreign borrowing[b]	Restrictions on the purchase of foreign currency[c]	Nominal import tariff[d]
1975	I	*p*(14)	*m*(18)	*q*(200)	57
	II	*p*(14)	*m*(6)	*q*(200)	57
	III	*p*(14)	*m*(18)	*q*(200)	44
	IV	*p*(14)	*m*(18)	*q*(200)	44
1976	I	*p*(14)	*m*(6)	*q*(200)	38
	II	*p*(14)	*m*(24)	*q*(200)	38
	III	*p*(14)	*m*(24)	*q*(1,000)	33
	IV	*p*(14)	*m*(24)	*q*(1,000)	27
1977	I	*p*(100)	*m*(24)	*q*(1,000)	24
	II	*p*(100)	*m*(24)	*q*(1,000)	22
	III	*p*(100)	*m*(24)	*q*(1,000)	20
	IV	*p*(100)	*m*(24)	*q*(1,000)	16
1978	I	*p*(100)	*m*(24)	*q*(1,000)	15
	II	*p*(100)	*m*(24)	*q*(1,000)	14
	III	*p*(100)	*m*(24)	*q*(1,000)	13
	IV	*p*(100)	*m*(24)	*q*(1,000)	12
1979	I	*p*(100)	*m*(24)	*q*(1,000)	11
	II	*p*(100)	*m*(24)	*q*(1,000)	10
	III	*p*(100)	*m*(24)	*q*(3,000)	10
	IV	*p*(100)	*m*(24)	*q*(3,000)	10
1980	I	*p*(100)	*m*(24)	*q*(3,000)	10
	II	*p*(100)	*m*(24)	*q*(3,000)	10
	III	*p*(100)	*m*(24)	*q*(10,000)	10
	IV	*p*(100)	*m*(24)	*q*(10,000)	10
1981	I	*p*(100)	*m*(24)	*q*(10,000)	10
	II	*p*(100)	*m*(24)	*q*(10,000)	10
	III	*p*(100)	*m*(24)	*q*(10,000)	10
	IV	*p*(100)	*m*(24)	*q*(10,000)	10
1982	I	*p*(100)	*m*(24)	*q*(10,000)	10
	II	*p*(100)	*m*(0)	*q*(10,000)	10
	III	*p*(100)	*m*(0) *g*	*q*(1,000)	10
	IV	*p*(100)	*m*(0) *g*	*q*(300)	10
1983	I	*p*(100)	*m*(0) *g*	*q*(200)	20
	II	*p*(100)	*m*(0) *g*	*q*(200)	20
	III	*p*(100)	*m*(0) *g*	*q*(200)	20
	IV	*p*(100)	*m*(0) *g*	*q*(200)	30
1984	I	*p*(100)	*m*(0) *g*	*q*(200)	20
	II	*p*(100)	*m*(0) *g*	*q*(200)	20
	III	*p*(100)	*m*(0) *g*	*q*(200)	30
	IV	*p*(100)	*m*(0) *g*	*q*(200)	30

[a] *p* (percentages): amount of profits as a percent of capital which can be repatriated.
[b] *m* (months): minimum term on the maturity of foreign loans. *g*: existence of preferential exchange rate for foreign loans.
[c] *q* (dollars): amount of dollars which can be bought without a written declaration of purpose.
[d] Percentage.

Source: Annual Report on Exchange Arrangements and Exchange Restrictions, 1975–1985 issues. International Monetary Fund.

Table B.2

Degree of tightness of capital controls.[a]

Control	Degree of tightness values
Amount of profits as a percent of capital which can be repatriated	
$p(100)$	0
$p(14)$	0.86
Minimum maturity of foreign loans	
$m(24)$	1
$m(18)$	0.75
$m(6)$	0.25
$m(0)$	0
Existence of preferential exchange rate for foreign loans	
g	1
Amount of dollars issued for travel	
$q(10{,}000)$	0.367
$q(3{,}000)$	0.740
$q(1{,}000)$	0.944
$q(300)$	0.970
$q(200)$	0.980

[a]In this table the weights for control (p) correspond to the criteria $(1-x)$ where x refers to the scaled down value in parenthesis. Control (m) is assumed to take the same linear form as control (p) but control (q) has a non-linear form e^{-x}. It is worth noting that for control (p), forms such as $(1-x)^2$ and $(1-x)^{1/2}$ were also tested empirically; and for control (q) the form e^{-2x} was also considered.

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